## WE CLAIM:

1		1.	An apparatus for producing a Bragg grating in an optical fiber, the
2	apparatus comprising:		
3		mean	s for controlling a Ti:sapphire laser to produce an output laser beam
4	having a wav	elength	in the range of approximately 230 to 250 nanometers; and
5		mean	s for using the output laser beam to produce the Bragg grating in the
6	optical fiber.		
1		2.	The apparatus of claim 1, wherein the controlling means comprises
2	means for pu	mping t	he Ti:sapphire laser with a second harmonic pump beam.
1		3.	The apparatus of claim 2, wherein the controlling means further
2	comprises me	eans for	producing a third harmonic of a laser beam emitted by the
3	Ti:sapphire la	iser.	
1		4.	The apparatus of claim 2, wherein the pumping means comprises:
2		active	laser means;
3		secon	d pumping means for pumping the active laser means; and
4		doubling means for doubling a fundamental frequency emitted by the	
5	active laser m	eans.	
1		5.	The apparatus of claim 2, wherein the controlling means further
2	comprises:		apparation of statute 2, wherein the controlling metallo futcher
3		triplin	ng means for generating a third harmonic beam from the second
4	harmonic pump beam; and		
5	F	•	s for mixing the third harmonic beam with a beam emitted by the
6	Ti:sapphire la		on the same and the same a
1		6.	The apparatus of claim 2, wherein the pumping means comprises a
2	diode laser.		
1		7.	The apparatus of claim 3, further comprising:
2		first re	esonator means; and

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second resonator means, wherein the Ti:sapphire laser is disposed within the first resonator means and at least a portion of the third harmonic means is disposed within the second resonator means.

8. The apparatus of claim 4, wherein the controlling means further

- 8. The apparatus of claim 4, wherein the controlling means further comprises resonator means, and wherein the active laser means and the doubling means are disposed within the resonator means.
- 9. The apparatus of claim 5, wherein the controlling means further comprises first resonator means and second resonator means, and wherein the Ti:sapphire laser is disposed within the first resonator means and the tripling means is disposed within the second resonator means.
- 10. The apparatus of claim 6, wherein the controlling means further comprises third resonator means, wherein the third harmonic means further comprises frequency doubling means and frequency tripling means, and wherein the frequency doubling means is disposed within the second resonator means and the frequency tripling means is disposed within the third resonator means.

An apparatus for producing a Bragg grating in an optical

- waveguide, the apparatus comprising:

  a solid state laser comprising a Ti:sapphire crystal for producing an output laser beam having a wavelength in the range of approximately 230 to 250 nanometers:
- a Bragg writer for using the output laser beam to produce the Bragg grating in the optical waveguide.
- 1 12. The apparatus of claim 11, wherein the solid state laser further 2 comprises:
- 3 an active laser medium;

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- 4 a pump for pumping the active laser medium to produce a fundamental 5 beam; and
- beam; and
   a first nonlinear crystal for producing a second harmonic pump beam from
   the fundamental beam, wherein the Ti:sapphire crystal is pumped by the second harmonic
   pump beam.

1		13.	The apparatus of claim 12, wherein the solid state laser further
2	comprises:		
3		a seco	and nonlinear crystal for producing a second harmonic beam from a
4	fundamental	beam ei	mitted by the Ti:sapphire crystal; and
5		a thire	d nonlinear crystal for producing a third harmonic beam by mixing
6	the fundamen	ital bear	m and the second harmonic beam.
1		14.	The apparatus of claim 12, wherein the solid state laser further
2	comprises:		The apparatus of claim 12, wherein the solid state faser further
3	comprises.	a trinl	er crystal for generating a third harmonic beam from the second
4	harmonic pump beam and the fundamental beam; and		
5	a mixing crystal for mixing the third harmonic beam with a beam emitted		
6	by the Ti:sapphire crystal.		
	-, <sub>F</sub>		,
1		15.	The apparatus of claim 12, wherein the pump comprises a diode
2	laser.		
1		16.	The apparatus of claim 12, wherein the solid state laser further
2	comprises a r	esonatii	ng cavity, and wherein the active laser medium and the first nonlinear
3		rystal are disposed within the resonating cavity.	
	•	•	
1		17.	The apparatus of claim 13, wherein the solid state laser further
2	comprises:		
3	a first resonator; and		
4	a second resonator, wherein the Ti:sapphire crystal is disposed within the		
5		and w	herein the second nonlinear crystal is disposed within the second
6	resonator.		
1		18.	The apparatus of claim 17, wherein the solid state laser further
2	comprises a th	nird res	onating cavity, and third nonlinear crystal is disposed within the third
3	resonating car	vity.	
1		10	A mode of Court of the December of the Court
1	41	19.	A method for producing a Bragg grating in an optical waveguide,
2	the method co	•	
3		pumpi	ing an active laser medium to generate a fundamental pump beam;

4		doublin	ng a frequency of the fundamental pump beam to generate a second	
5	harmonic pump beam;			
6		pumpin	g a Ti:sapphire crystal with the second harmonic pump beam;	
7		generat	ing a third harmonic beam from the second harmonic pump beam,	
8	the third harm	onic bea	m having a wavelength in the range of approximately 230 to 250	
9	nanometers; a	nd		
10		using th	ne third harmonic beam to produce the Bragg grating in the optical	
11	waveguide.			
1		20.	A method for producing a Bragg grating in an optical waveguide,	
2	the method co	mprising	ç,	
3		pumpin	g an active laser medium to generate a fundamental pump beam;	
4		doublin	g a frequency of the fundamental pump beam to generate a second	
5	harmonic pum	p beam;		
6		pumping a Ti:sapphire crystal with the second harmonic pump beam;		
7		generati	ing a third harmonic beam from the second harmonic pump beam;	
8		mixing	the third harmonic beam with a beam emitted by the Ti:sapphire	
9	crystal to prod	roduce an output beam having a wavelength in the range of approximately 230		
10	to 250 nanome	to 250 nanometers; and		
11	using the output beam to produce the Bragg grating in the optical			
12	waveguide.			
1		21.	An apparatus for producing a Bragg grating in an optical	
2	waveguide, the apparatus comprising:			
3		diode la	ser means for producing a third harmonic laser beam having a	
4	wavelength in the range of approximately 230 to 250 nanometers; and			
5		means for using the third harmonic laser beam to produce the Bragg		
6	grating in the	optical w	aveguide.	
1		22.	The apparatus of claim 21, wherein the diode laser means	
2	comprises a V	CSEL.		
1		23.	The apparatus of claim 21, wherein the diode laser means emits a	

fundamental beam at approximately 720 nanometers.

1		24.	The apparatus of claim 21, wherein the diode laser means
2	comprises a diode laser bar.		
1		25.	An apparatus for producing a diffraction pattern in an optical fiber,
2	the apparatus	•	S
3		a dioc	le laser for producing a third harmonic laser beam having a
4	wavelength i	n the rai	nge of approximately 230 to 250 nanometers; and
5		a Bragg writer for using the third harmonic laser beam to produce the	
6	diffraction pattern on the optical fiber.		
1	Haani	26.	The apparatus of claim 25, wherein the diode laser comprises a
2	VCSEL.		
1		27.	The apparatus of claim 25, wherein the diode laser emits a
2	fundamental	beam at	approximately 720 nanometers.
1		28.	The apparatus of claim 25, wherein the diode laser comprises a
2	diode laser ba	ar.	
1		29.	An apparatus for producing a Bragg grating in an optical
2	waveguide, th	ne appar	ratus comprising:
3		a solic	d state laser comprising a Ti:sapphire laser medium, wherein the
4	solid state laser emits an output beam having a wavelength in the range of approximately		
5	230 to 250 nanometers; and		
6	a phase mask interferometer for using the output beam to produce the		
7	Bragg grating	_	optical waveguide.
	000		,
1		30.	The apparatus of claim 29, wherein the phase mask interferometer
2	comprises:		
3		a phas	e mask for diffracting rays from the output beam;
4		a first	mirror; and
5		a seco	nd mirror, wherein the first mirror and the second mirror reflect a
6	first ray and a second ray diffracted by the phase mask and cause the first and second rays		
7	to interfere with an another		

1	31	. The apparatus of claim 29, wherein the phase mask interferometer	
2	comprises:		
3	_	phase mask for diffracting rays from the output beam; and	
4	a t	clock for refracting rays diffracted by the phase mask.	
1	32	. The apparatus of claim 29, wherein the phase mask interferometer	
2	comprises means for rotating the optical waveguide.		
1	33	. The apparatus of claim 30, further comprising means for translating	
2	at least one of the first mirror and the second mirror.		
1	34	. The apparatus of claim 30, further comprising means for rotating at	
2	least one of the first mirror and the second mirror.		
1	35	. An apparatus for producing a Bragg grating in an optical	
2	waveguide, the apparatus comprising:		
3	a solid state laser comprising a Ti:sapphire laser medium, wherein the		
4	solid state laser emits an output beam having a wavelength in the range of approximately		
5	230 to 250 nanometers; and		
6	a phase mask interferometer for using the output beam to produce the		
7	Bragg grating in the optical waveguide, the phase mask interferometer comprising:		
8	a p	hase mask for diffracting rays from the output beam;	
9	a f	irst mirror;	
10	a s	econd mirror; and	
11	an	actuator for translating at least one of the first mirror and the second	
12	mirror, wherein the first mirror and the second mirror reflect a first ray and a second ray		
13	diffracted by the phase mask and cause the first and second rays to interfere with one		
14	another, thereby p	roducing a portion of the Bragg grating.	
1	36.	An apparatus for producing a Bragg grating in an optical	
2	waveguide, the ap	paratus comprising:	
3	a s	olid state laser comprising a Ti:sapphire laser medium, wherein the	
4	solid state laser er	nits an output beam having a wavelength in the range of approximately	
5	230 to 250 nanometers; and		

a proximity mask for using the output beam to produce the Bragg grating		
in the optical waveguide.		
37. An apparatus for producing a Bragg grating in an optical		
waveguide, the apparatus comprising:		
a solid state laser comprising a Ti:sapphire laser medium, wherein the		
solid state laser emits an output beam having a wavelength in the range of approximately		
230 to 250 nanometers; and		
a Lloyd mirror for using the output beam to produce the Bragg grating in		
the optical waveguide.		
38. An apparatus for producing a Bragg grating in an optical		
waveguide, the apparatus comprising:		
a solid state laser comprising a Ti:sapphire laser medium, wherein the		
solid state laser emits an output beam having a wavelength in the range of approximately		
230 to 250 nanometers; and		
a prism interferometer for using the output beam to produce the Bragg		
grating in the optical waveguide.		
39. The apparatus of claim I, wherein the prism interferometer		
comprises:		
a prism; and		
means for rotating the prism to control a Bragg wavelength of the Bragg		
grating.		
40. An apparatus for producing a Bragg grating in an optical		
waveguide, the apparatus comprising:		
a solid state laser comprising a Ti:sapphire laser medium, wherein the		
solid state laser emits an output beam having a wavelength in the range of approximately		
230 to 250 nanometers; and		
phase mask projection means for using the output beam to produce the		
Bragg grating in the optical waveguide.		
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41. An apparatus for producing a Bragg grating in an optical		
waveguide, the apparatus comprising:		

a laser medium;

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4	a pump for stimulating the laser medium to emit a fundamental pump
5	beam;
6	a doubler crystal for doubling the frequency of the fundamental beam to
7	produce a second harmonic pump beam;
8	a solid state laser comprising a Ti:sapphire laser medium which is pumped
9	by the second harmonic pump beam to emit a fundamental beam;
.0	at least one nonlinear crystal for producing a harmonic beam from the
1	fundamental beam, the harmonic beam having a wavelength in the range of
2	approximately 230 to 250 nanometers;
3	a processor;
4	means for actuating wavelength control elements according to control
5	signals from the processor;
6	means for measuring a wavelength of the harmonic beam and for sending a
7	measurement signal to the processor;
8	a control for sending a wavelength signal to the processor, the wavelength
9	signal indicating a desired wavelength of the harmonic beam; and
0:	Bragg writing means for using the harmonic beam to produce the Bragg
1	grating in the optical waveguide, wherein the processor controls the rotation means and
2	the temperature control means such that an actual wavelength of the harmonic beam is
3	within a predetermined number of nanometers of the desired wavelength.

42. The apparatus of claim 41, wherein the wavelength control elements are selected from the group consisting of gratings, prisms, etalons and birefringent filters.